

CHAPTER 14

SINGLE-CABINET ASOS (SCA) AND ASSOCIATED EQUIPMENT

SECTION I. DESCRIPTION AND LEADING PARTICULARS

14.1.1 INTRODUCTION

The single-cabinet ASOS (SCA) contains both the Acquisition Control Unit (ACU) and data collection package (DCP) within one cabinet and is designed for outdoor installation. The same peripherals and sensors are used on the SCA as on the standard ASOS. This chapter documents the SCA cabinet and associated equipment. The table of contents is referenced for the chapters containing sensors and optional equipment used by both the SCA and the standard ASOS.

14.1.2 SITE DESCRIPTION

A typical SCA site, figure 14.1.1, has the SCA cabinet (with ACU and DCP equipment) located outdoors. The single-cabinet ASOS configuration need not be located at an airfield: any clear site with 115 Vac, 1 ϕ , and telephone service will suffice.

NOTE

The SCA discussed in this chapter is different from the standard ASOS Class I reduced capability configuration. The SCA contains both the ACU and DCP in an equipment cabinet designed for outdoor use. The ASOS Class I reduced capability configuration uses the standard indoor ACU equipment cabinet (which requires shelter) and contains internal (local) DCP interface for sensors located close to the shelter. Chapter 2 is referenced for ASOS Class I reduced capability configuration.

14.1.3 PURPOSE OF CHAPTER

This chapter serves as the primary source of technical information for site maintenance personnel engaged in maintaining the SCA. SCA theory presented in this chapter is similar to the theory for the standard ASOS discussed in Chapter 1. Information provided in this chapter enables maintenance personnel to quickly remedy any problem and restore the SCA to service. This chapter must be used with other chapters in this ASOS Site Maintenance Manual (STM) and other publications listed in paragraph 14.1.5.

14.1.4 SCOPE OF CHAPTER

This chapter provides all information necessary for SCA on-site maintenance support. Included are preventive maintenance instructions, operation, fault isolation, and removal/installation of field replaceable units (FRU's). For information on sensor subsystems, the respective chapters of this Site Technical Manual (STM) are referenced. Chapter 14 includes five sections as described in the following paragraphs.

14.1.4.1 Section I, Description and Leading Particulars. This section provides an overview of the system/subsystem and should be used to gain a general understanding of the SCA configuration or to obtain physical descriptions and location information.

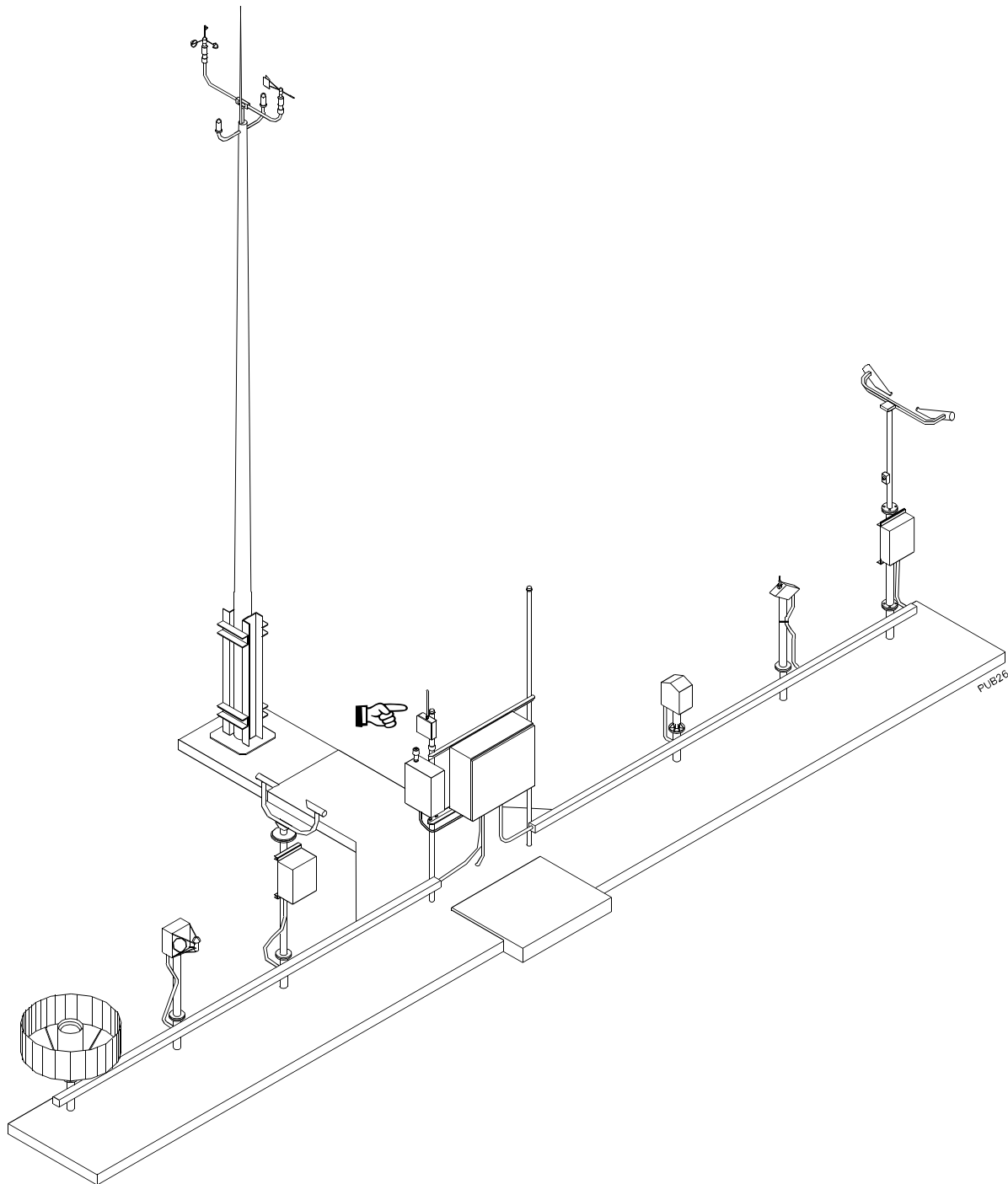


Figure 14.1.1. Typical ASOS Site, Single-Cabinet Configuration

14.1.4.2 **Section II, Installation.** Section II assumes that the SCA FRU's were previously installed by the factory installation team and that all mounting hardware and electrical wiring is in place.

14.1.4.3 **Section III, Operation.** Section III provides procedures for sequencing power, initializing, determining operational status, and operating the SCA. This information enables maintenance personnel to effectively use the SCA, but does not repeat information contained in Chapter 1, Section III which applies generally to SCA sites as well as for standard ASOS sites. Standard operating procedures (SOP's) are provided in the ASOS Software Users Manual.

14.1.4.4 **Section IV, Theory of Operation.** Section IV provides detailed SCA theory of operation and contains basic and detailed block diagrams.

14.1.4.5 **Section V, Maintenance.** Section V provides SCA corrective and preventive maintenance procedures for cleaning and inspection, adjustment, calibration, troubleshooting using resident diagnostic firmware, and failed FRU removal/replacement. The SCA parts lists are **located after the last chapter in volume II**. SCA sites may also include up to three remote DCP's and associated sensors. Section 14.5 should be used as a troubleshooting guide or when performing SCA scheduled or corrective maintenance.

14.1.5 RELATED PUBLICATIONS

In addition to this chapter, the SCA site is supported by the other chapters of ASOS Technical Manual (STM) S100, in addition to the following manuals:

- ! ASOS Software User's Manual - Provides detailed information on ASOS operation and ASOS OID displays.
- ! ASOS Ready Reference Guide - Contains ASOS operator reference information.
- ! Link MC70 User's Guide - Provides OID vendor support information.
- ! Panasonic dot matrix printer model KX-P3123 Operating Instructions Manual - Provides dot matrix printer vendor support information.
- ! UDS 2440 Installation and Operation - Provides model 2440 stand-alone telephone modem vendor support documentation.
- ! UDS V.3225 Installation and Operation - Provides model V.3225 stand-alone telephone modem vendor support documentation.
- ! UDS V.3400 Installation and Operation - Provides vendor support documentation for the model V.3400 stand-alone telephone modems.

14.1.6 SCA FUNCTIONAL DESCRIPTION

As shown in the basic block diagram (figure 14.1.2), the typical SCA consists of a central cabinet, sensors that gather weather information, and modems that communicate with user facilities. Optional peripherals may include a laptop computer (not supplied) that allows data access and equipment control during maintenance activities. An optional, standard FAA handset allows voice messages to be appended to the computerized observation message to convey special information for pilots (e.g., Notice to Airmen Messages (NOTAM's)).

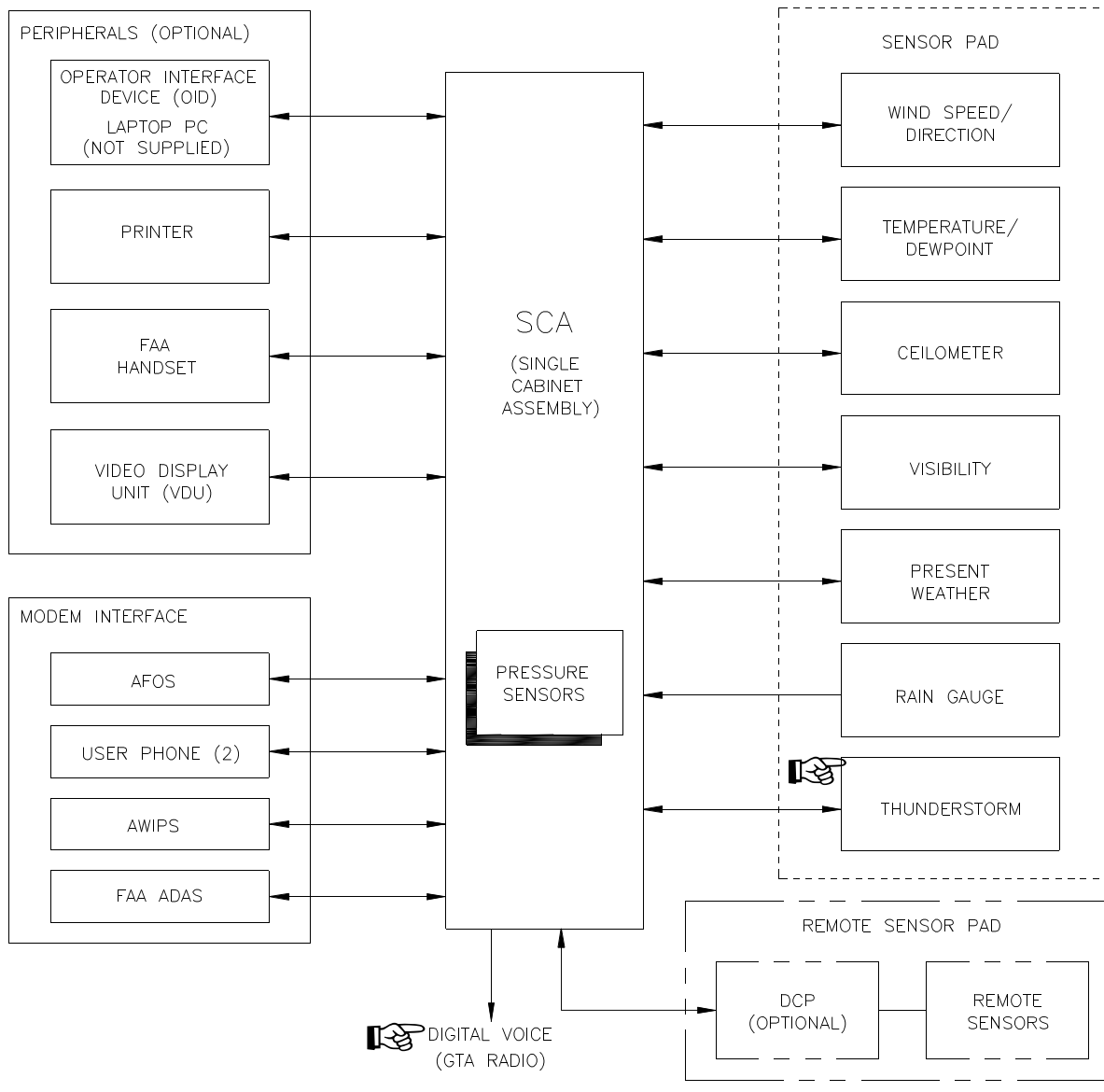
Other optional terminal equipment available for the standard ASOS is also available for the SCA. Regardless of configuration type, all ASOS sites contain at least three major units: ACU or SCA, sensors, and peripherals. The SCA and standard ASOS ACU cabinet may be supplemented by up to three (optional) DCP's at sites where remote data collection is required.

The SCA can accommodate a ground-to-air (GTA) radio and a Codex Modem. A weatherproof auxiliary box (aux box) is provided to accommodate either or both of these units plus a second (optional) uninterruptible power supply (UPS) unit. When required, the aux box will be installed with the SCA.

SCA ASOS sites differ in the quantity of each component type included in the configuration but all sites

include only one SCA cabinet. The SCA site may include any of the standard or optional equipment items listed in the parts list. Chapter 3 contains information on DCP's. Each sensor performs a specialized function in gathering local raw surface weather data. At a minimum, the typical ASOS site has sensors to collect pressure, temperature/dewpoint, wind, and precipitation data. At the typical SCA site, the SCA houses all on-site equipment and the pressure sensors. Sensors, other than the pressure sensors, are mounted external to the SCA.

The entire SCA is designed to operate outdoors. Data and phone lines may be routed to an airport terminal (or other building) where one operator interface device (OID) and/or one video display unit (VDU) may be located (but not more than 100 feet from the SCA). Sensors are either polled by the SCA or automatically transfer data to the SCA for incorporation into the ASOS data processing scheme. Up to 13 local sensors (in addition to the pressure sensors) can be connected directly to the SCA. At sites where an optional DCP is installed, up to 16 additional sensors may be added per DCP.



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Figure 14.1.2. Single-Cabinet ASOS, Basic Block Diagram

14.1.7 SCA CONFIGURATION

Each SCA is configured to meet specific site-peculiar requirements. The established site configuration can be reviewed by accessing the site configuration screens via an operator interface device (OID), laptop personal computer (PC), or remote terminal. This site maintenance manual provides maintenance documentation for all assemblies and subassemblies included in the ASOS but does not relate to any specific configuration. The technician should consult the configuration pages and site specific documentation to determine sensor configuration, sensor pad configuration, assigned peripherals, facility power, and signal cable routing.

SCA sites can be equipped with a wide variety of equipment, depending upon operational requirements and customer options. To accommodate site requirements, core equipment complements have been established to which sensor subsystems, peripheral equipment, and options can be added by selecting kits. These kits are a collection of assemblies and parts needed to install those assemblies. Shelters are not required for any SCA configuration. Core single-cabinet systems are designated as follows:

S1	-	Class I SCA, for small airports. SCA core equipment complement includes power delay relay, two pressure sensors, precipitation identification, cloud height, visibility, rain gauge, temperature/dewpoint, and wind sensors. May have the aux box if site includes codex modem or GTA Radio.	\$ \$ \$ \$
S2	-	Class II SCA, for special nonairport sites. SCA includes UPS with power delay and UPS bypass, may have up to three DCP's (each with a UPS), and may have the aux box (and an additional UPS). S2 SCA includes three pressure sensors, wind, temperature/dewpoint, visibility, cloud height, precipitation ID, rain gauge sensors. An OID is also standard equipment at S2 sites.	\$ \$
SR	-	Class I SCA with reduced capability (no optical sensors), includes power delay relay, two pressure sensors, rain gauge, temperature/dewpoint, and wind sensors.	\$ \$

14.1.8 SCA PHYSICAL DESCRIPTION

The SCA houses and interconnects the FRU's which are identified on figure 14.1.3 and in table 14.1.1. The SCA parts list (**located after the last chapter in volume II**) contains part number information.

14.1.8.1 **Mounting Plate Assembly 7A1A1**. Most of the SCA electronic assemblies are located on Mounting Plate Assembly 7A1A1. The mounting plate is secured on studs against the inside back surface of the SCA. The following FRU's are mounted on Mounting Plate Assembly 7A1A1:

14.1.8.1.1 **VME Rack 7A1A1A2 Description**. The VME rack assembly, shown in figure 14.1.4, contains 2 rows of 96-pin connector sockets on the backplane for up to 21 printed circuit card assemblies (CCA's). Reference designators for each card are located on a marker strip at the top-front of the rack. The top row of connectors are for the 32-bit VME data bus, while the lower row provides interconnections and operating voltages. Three exhaust fans are mounted beneath the rack to force cooling air upward, between, and around installed CCA's.

14.1.8.1.2 **Circuit Breaker Panel 7A1A1A3 Description**. The circuit breaker panel is located below the VME rack. The panel contains 22 single-pole magnetic circuit breakers and a DB-25F connector socket (J1) for connecting the primary OID. At most SCA sites, the only OID will be the technicians laptop PC. An optional DB-25 to telco adapter (PN 62828-90197-1) is available for RS-232 interface to the PC via 4-conductor telephone cable.



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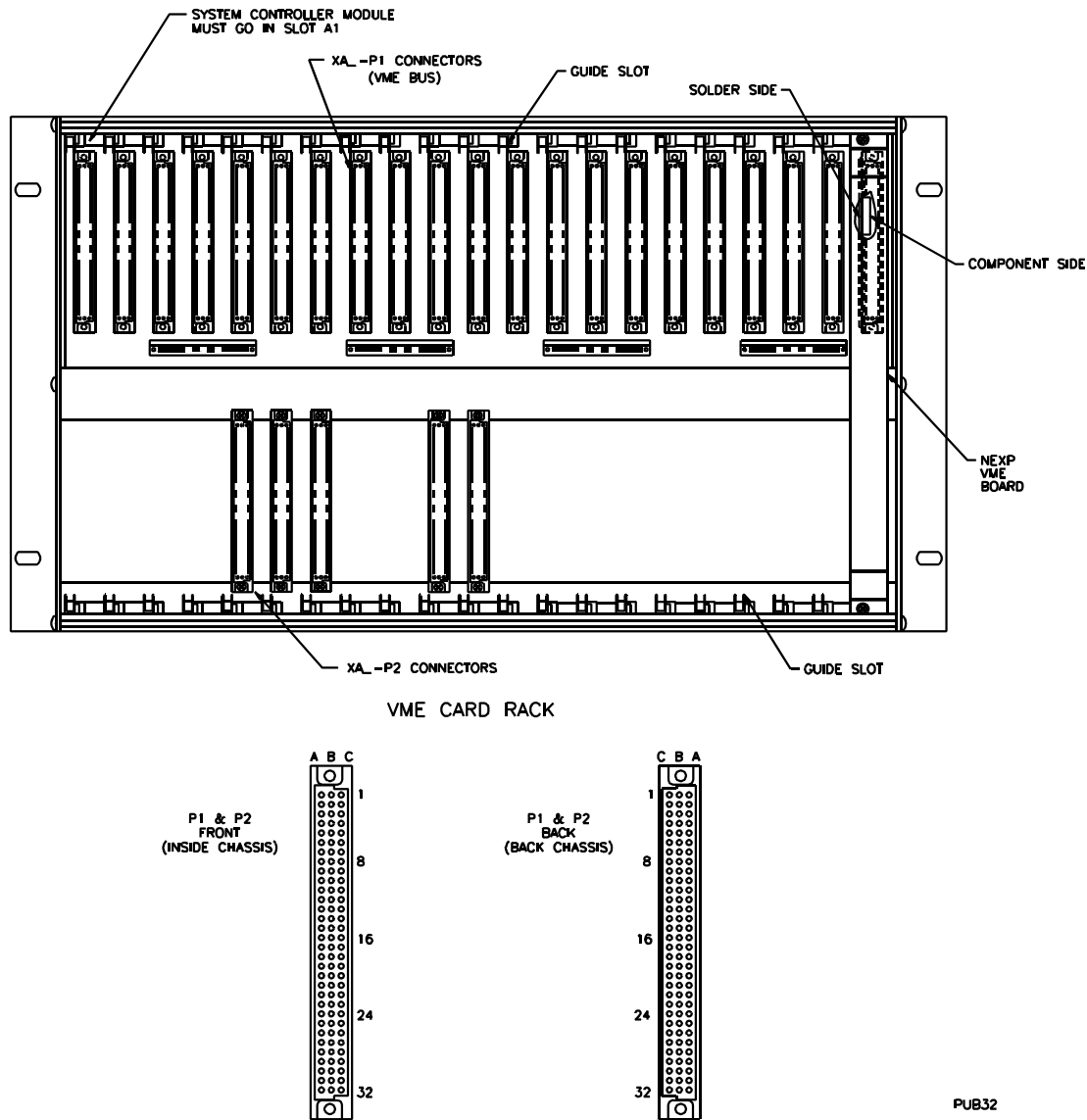


Figure 14.1.4. VME Rack 7A1A1A2, Front View

14.1.8.1.3 AC Power Distribution Assembly 7A1A1A4 Description. The AC power distribution assembly is mounted vertically at the center of the cabinet. The assembly contains 27 rail-mounted terminal blocks. Each terminal block has four screw-swaged wire terminals to provide connections for 115 VAC, neutral, and ground wires.

14.1.8.1.4 RF Modem Shelf 7A1A1A5 Description. The rf modem shelf (optional) is located above the ac power distribution assembly in the center of the cabinet. The rf modem shelf provides mounts and interconnections for up to two rf modems (optional) and RF Switch 7A1A1A5S1. The rf modem provides the communications link between the SCA and DCP's when the site configuration includes DCP's. The second rf modem and rf switch provide a redundant communications link between the SCA and DCP in the event that the primary rf modem fails.

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When a Motorola modem (62828-90315-XX) fails and spare Motorola modems are not available, a Johnson Data modem (62828-40506-X), an adapter cable (62828-42110-10), and a SMAM-to-BNCF adapter must be ordered to replace the failing modem. Kit part number 62828-40378-xx can be ordered the first time that the Johnson Data modem is installed in the SCA.

The original equipment SCA rf modem shelf must be replaced with rf modem shelf 62828-40322-20 to support mounting both the Motorola and Johnson Data modems (Motorola and Johnson Data modems can coexist within the SCA).

The adapter cable and SMAM-to-BNCF adapter must be removed if a Johnson Data modem fails and a Motorola modem is installed.

14.1.8.1.4A Uninterruptible Power Supply 7A1A1A6 Description. A UPS is included in the Class II SCA to provide a backup ac power source for the SCA and up to nine sensors. If more than nine sensors are associated with a Class II SCA, a secondary UPS is installed in an optional auxiliary box. Either Deltek UPS 62828-90338-10 or Deltek UPS 62828-90338-20 may be installed.

14.1.8.1.5 Pressure Mounting Assembly 7A1A1A7 Description. The pressure mounting assembly is located above the rf modem shelf. The assembly provides mounts and interconnections for three identical pressure sensor assemblies (7A1A1A7A1, A2, and A3) as shown on figure 14.1.5. Temperature sensor board (7A1A1A7A4) is mounted on the front of the pressure sensor shelf. Plastic vent tubes from each sensor are joined under the pressure shelf to a tube cross and then routed to the pressure port at the top of the cabinet.

14.1.8.1.6 Power Outlet Strip 7A1A1A8 Description. The outlet strip is mounted below the UPS, on the bottom left side of the cabinet. The outlet strip is rated at 15 amperes, continuous, and provides connection for up to five ac power plugs (with grounding pins)

14.1.8.1.7 User Modems 7A1A1A9, A10 Description. The user modems are located at the top of the cabinet, next to the VME rack. User modems operate as stand-alone 2400, 9600, or 28800 baud modems that connect to dedicated lines. User 1 Modem 7A1A1A9 is supplied with each system and is used to connect to the AOMC. Optional User 2 Modem 7A1A1A10 provides an additional dedicated line connection to the SCA.

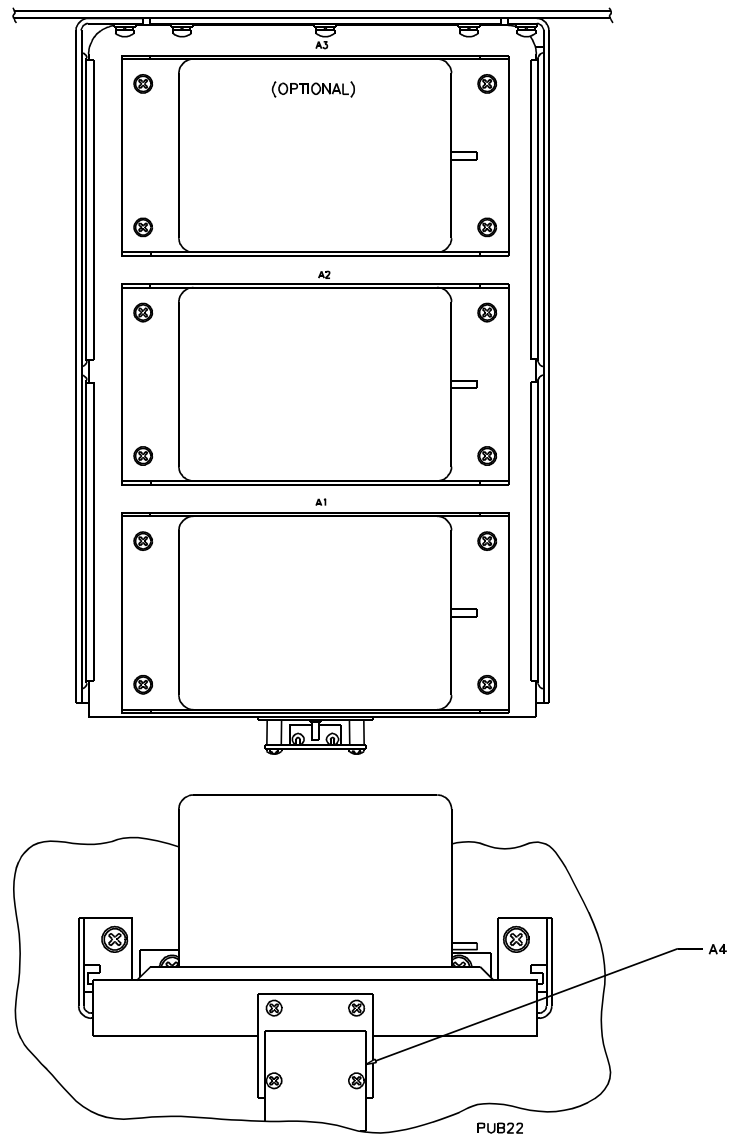


Figure 14.1.5. Pressure Sensor Shelf 7A1A1A7, Front View

14.1.8.1.8 Optional Modems 7A1A1A11, A12 Description. The optional modems are located in the upper left corner of the cabinet. The optional modems can be 2400, 9600 or 28800 baud. The optional modems are used to connect to AFOS, OID's, VDU's, printer, or telco.

14.1.8.1.9 Power Reset Assembly 7A1A1A13 Description. Power Reset Assembly 7A1A1A13 is located to the left of the ac power distribution assembly. The power reset assembly contains a Time Delay Relay 7A1A1A13K1 (Class I and Class II), Digital I/O Module 7A1A1A13K2 (Class II only), and Power Relay 7A1A1A13K3 (Class II only). The time delay relay ensures that the SCA resets properly after power is interrupted by delaying power application approximately three seconds. The digital I/O module and power relay provide the Class II SCA with UPS bypass capabilities.

14.1.8.2 Faraday Box 7A1A3 Description. The Faraday box is located in the lower right corner of the cabinet, beneath the circuit breaker panel. All SCA external signal and power lines pass through flex conduits in the bottom of the Faraday Box to prevent rain water from entering the cabinet. Fiber optic cables that enter the Faraday Box connect to fiber optic modems located on the top of the Faraday box. The Faraday box also contains two columns of track-mounted terminal blocks on the back side of the hinged front cover that terminate external power and signal lines. The Faraday box has an internal cable assembly that connects the terminals to connectors mounted on the top or left side surfaces of the box as shown on figure 14.1.6. Mating connectors are part of SCA wiring harness 7A1W106. Dependent upon the site specific SCA equipment configuration, blank cover plates are used in place of connectors not used by the SCA.

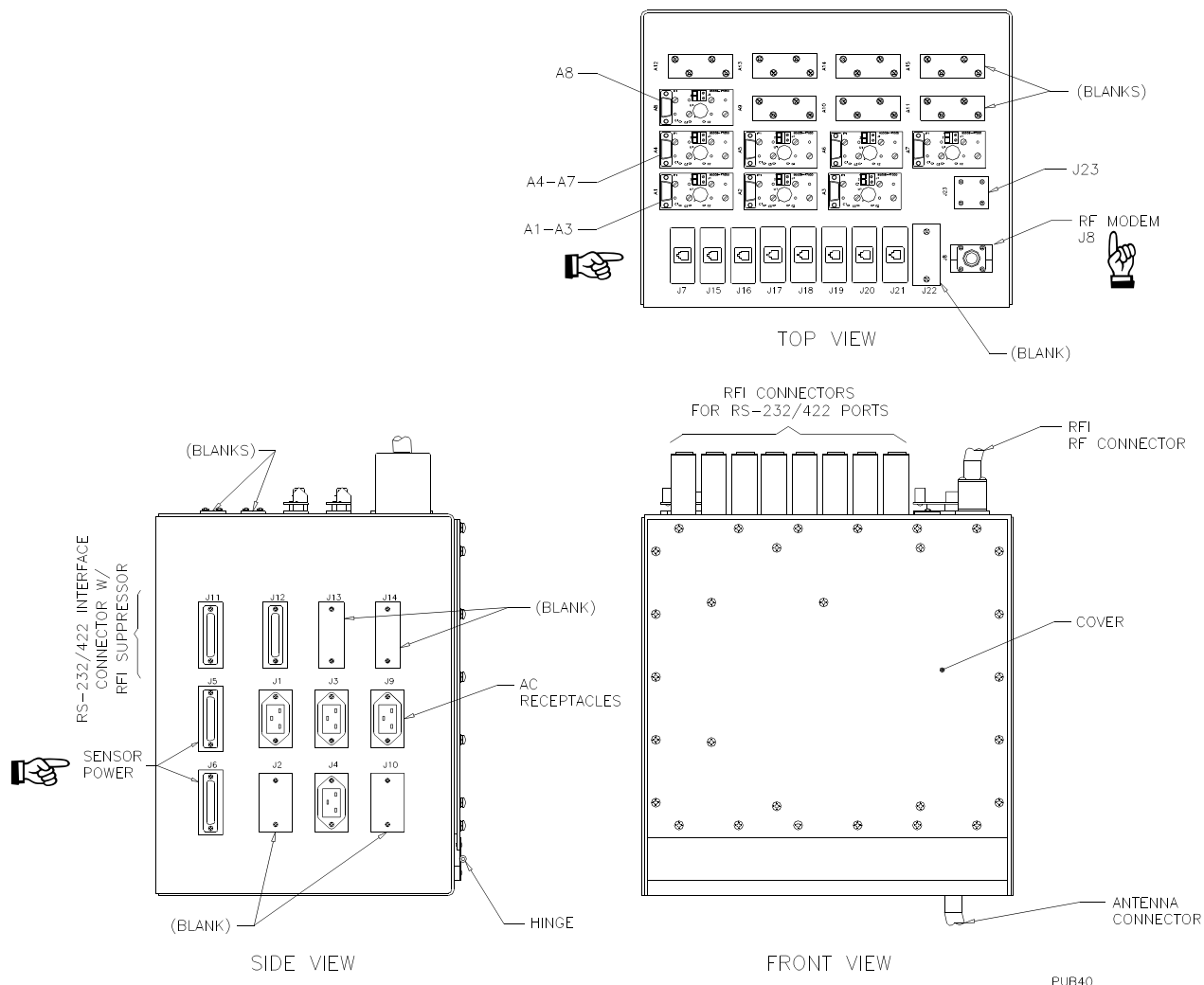


Figure 14.1.6. Faraday Box A3, Panel Views

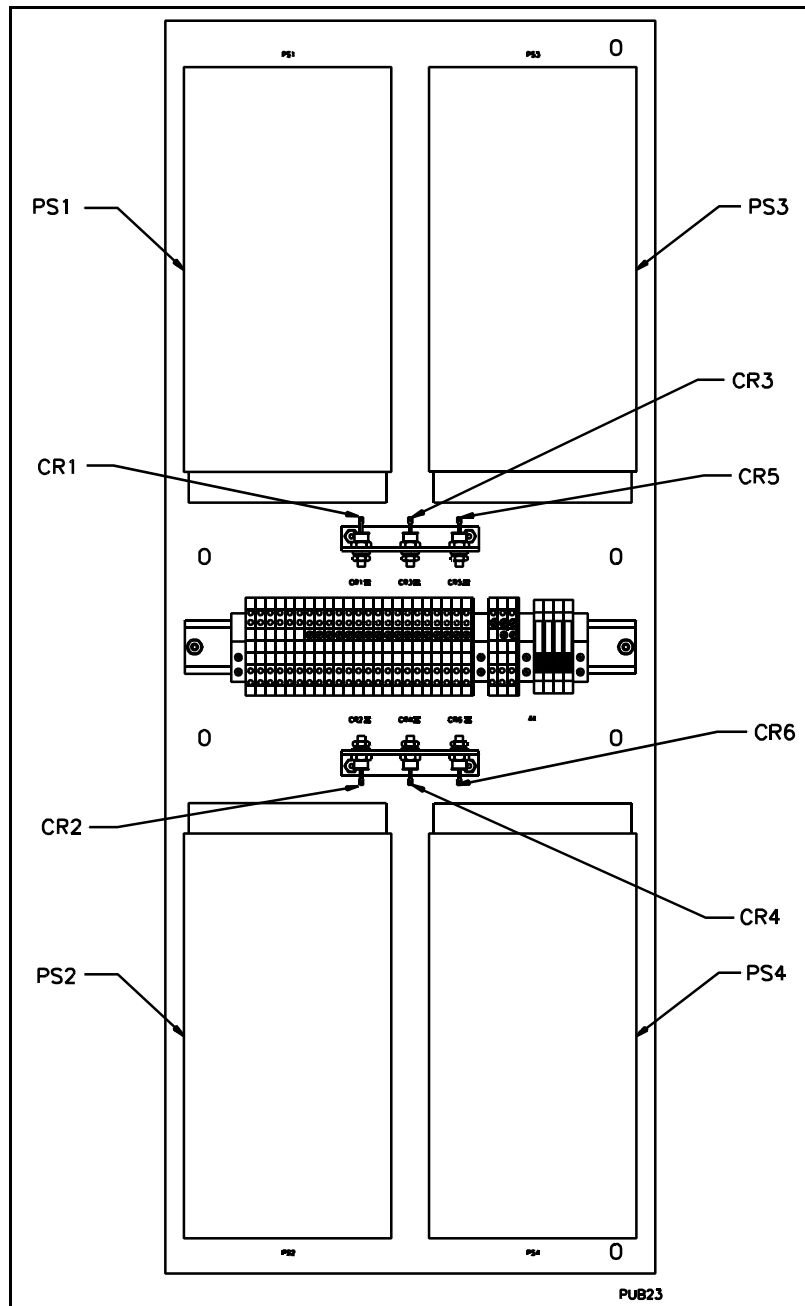


Figure 14.1.7. Power Supply Assembly A4, Front View

14.1.8.3 Power Supply Mounting Plate 7A1A4. The power supply mounting plate (figure 14.1.7) is mounted against the SCA right side interior and supplies all dc operating voltages (-12V, +12V, and +5V) for the other assemblies in the SCA. Each of two 12V supplies output both -12V and +12V, while the two 5V supplies output positive voltage only. Supply outputs are paired by OR diodes, so that loss of either supply of a pair can not affect the operating voltage. The power supply mounting plate also includes DC Power Distribution Assembly 7A1A4A1, which distributes all dc operating voltages and protects the power supply inputs with 3.15A fuses on the 5V supply inputs and 2.5A fuses on the 12V supply inputs.

14.1.8.4 Modems 7A1A5, A6 Description. These optional, additional modems are located in the lower right corner of the cabinet. The type and use of these modems are established for each site by the customer.

14.1.8.5 **Optional Solar Shield.** A solar shield kit (P/N 62828-40409-10) is available for SCA sites that experience intense solar load and high temperatures.

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14.1.9 AUXILIARY BOX PHYSICAL DESCRIPTION

14.1.9.1 **Enclosure.** The auxiliary box (figure 14.1.8 and table 14.1.2) is a weather-resistant enclosure that measures approximately 42 inches in width and 36 inches high, exclusive of mounting tabs.

14.1.9.2 **Auxiliary Box Standard Equipment.** Supplied as standard equipment in Auxiliary Box 7A2 are AC Power Distribution Strip 7A2A1A4, Modem Mounting Shelf 7A2A1A5 (without the modems), and Heater Strip 7A2A1HR1. All other equipment components to be installed in the aux box are customer-ordered options, delivered as separate kits.

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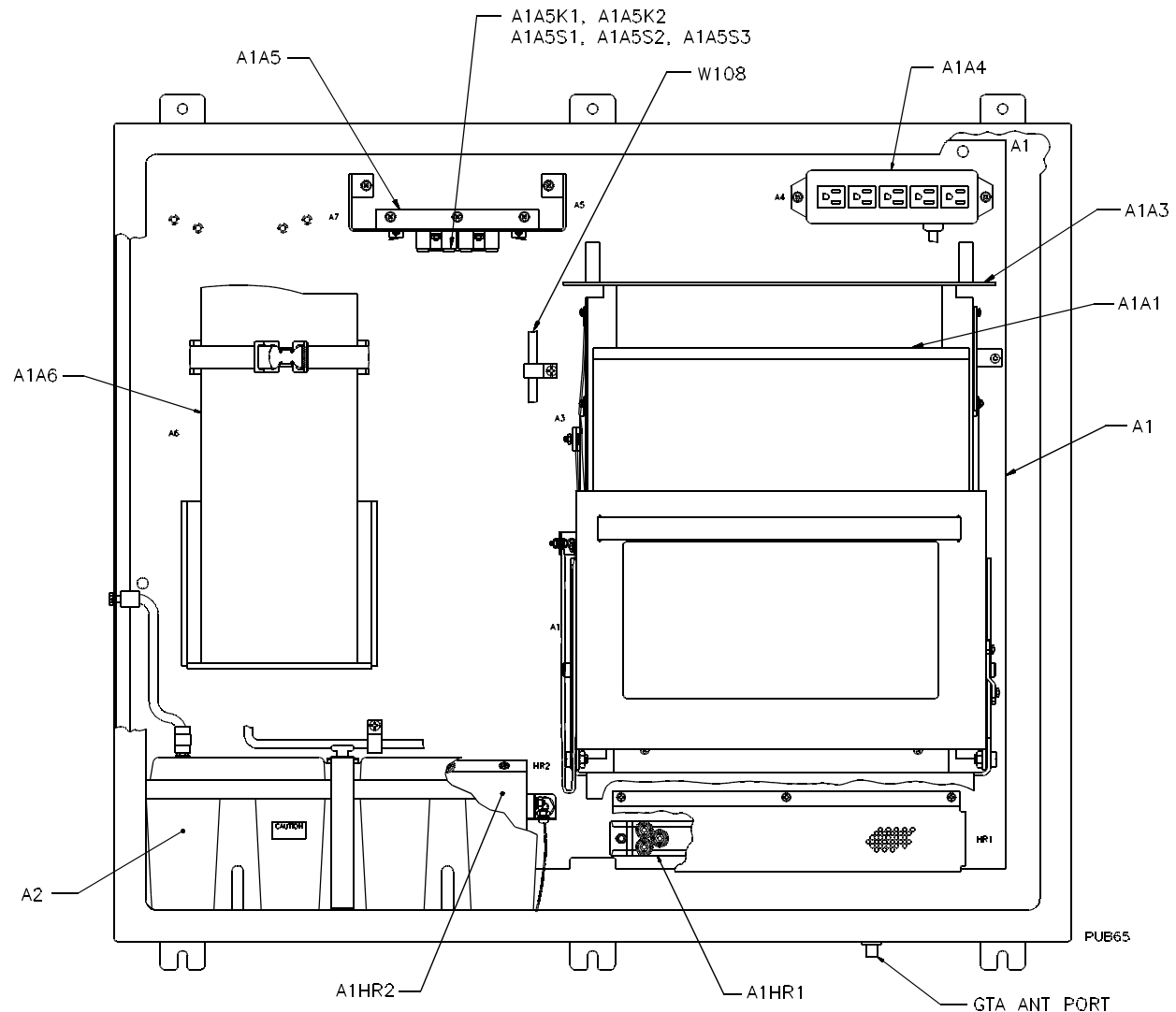


Figure 14.1.8. Auxiliary Box 7A2, Interior View

Table 14.1.2. Auxiliary Box (7A2) Major Components

Ref Des	Description	Ref Des	Description
7A2A1	Mounting Plate Assembly	7A2A1A5K1, K2, S1-S3	Heater control circuit
7A2A1A1	Codex Modem (Optional)	7A2A1A6	UPS (Optional)
7A2A1A2	UPS Bypass Assembly (Optional)	7A2A1HR1	Heater, Battery
7A2A1A3	GTA Radio (Optional)	7A2A1HR2	Heater, Battery (Optional)
7A2A1A4	Power Outlet Strip	7A2A2	Battery Box Assembly (Optional)
7A2A1A5	Modem Shelf	7A2W108	Wiring Harness

14.1.9.2.1 Mounting Plate Assembly 7A2A1. Most of the aux box assemblies are located on Mounting Plate Assembly 7A2A1. The mounting plate is secured on studs against the inside back surface of the aux box. The following FRU's are mounted on Mounting Plate Assembly 7A2A1.

14.1.9.2.2 Power Outlet Strip 7A2A1A4 Description. The outlet strip is mounted in the upper right corner of the cabinet. The outlet strip is rated at 15 amperes, continuous, and provides connection for five ac power plugs (with grounding pins) including the GTA radio and Codex modem.

14.1.9.2.3 Modem Shelf 7A2A1A5 Description. The modem shelf (optional) in the top center of the cabinet. The modem shelf provides mounts and interconnections for up to two additional modems (optional future expansion). The shelf also mounts the aux box heater control circuitry.

14.1.9.3 Auxiliary Box Optional Equipment. Available optional kits are:

- ! Codex Modem Kit 7A2A1A1
- ! Auxiliary UPS Kit, including UPS 7A2A1A6 and Battery Box 7A2A2
- ! GTA Radio Kit, including GTA Radio 7A2A1A3

\$ 14.1.10 ALTERNATIVE GTA RADIO ANTENNA MOUNTING KIT

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\$ At some SCA combined sites where interference between the GTA radio and the installed sensors is possible, **\$** an alternative GTA Radio Mounting Kit (Part Number 62828-40507-10) is installed. This antenna is a unity **\$** gain omnidirectional antenna that is precision field-tuned to the GTA frequency. The antenna is mounted **\$** near the top of the wind tower. The type and height of the antenna prevents radio frequency interference **\$** from the GTA radio with the operation of the present weather sensor.